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FIG. 4

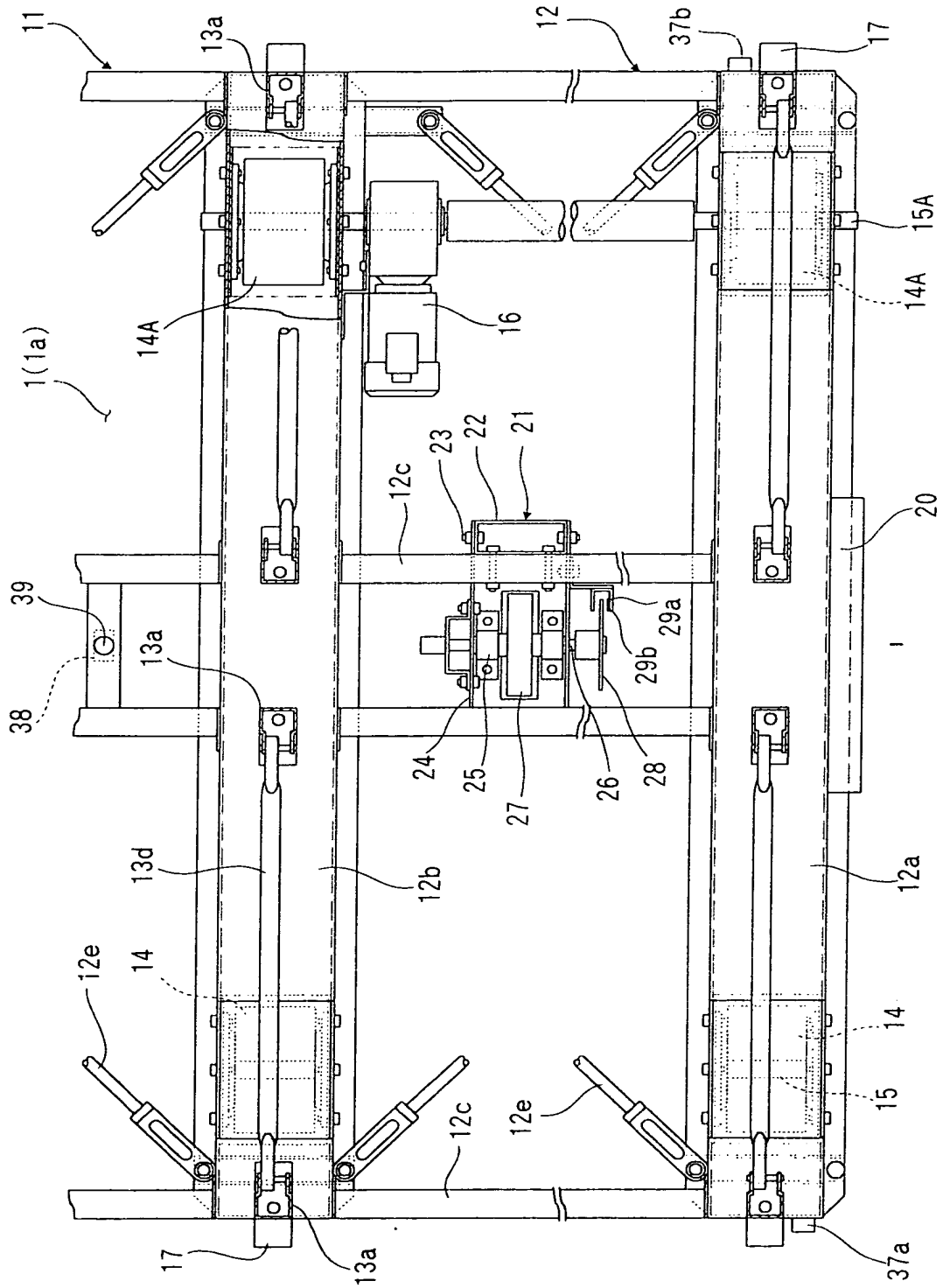
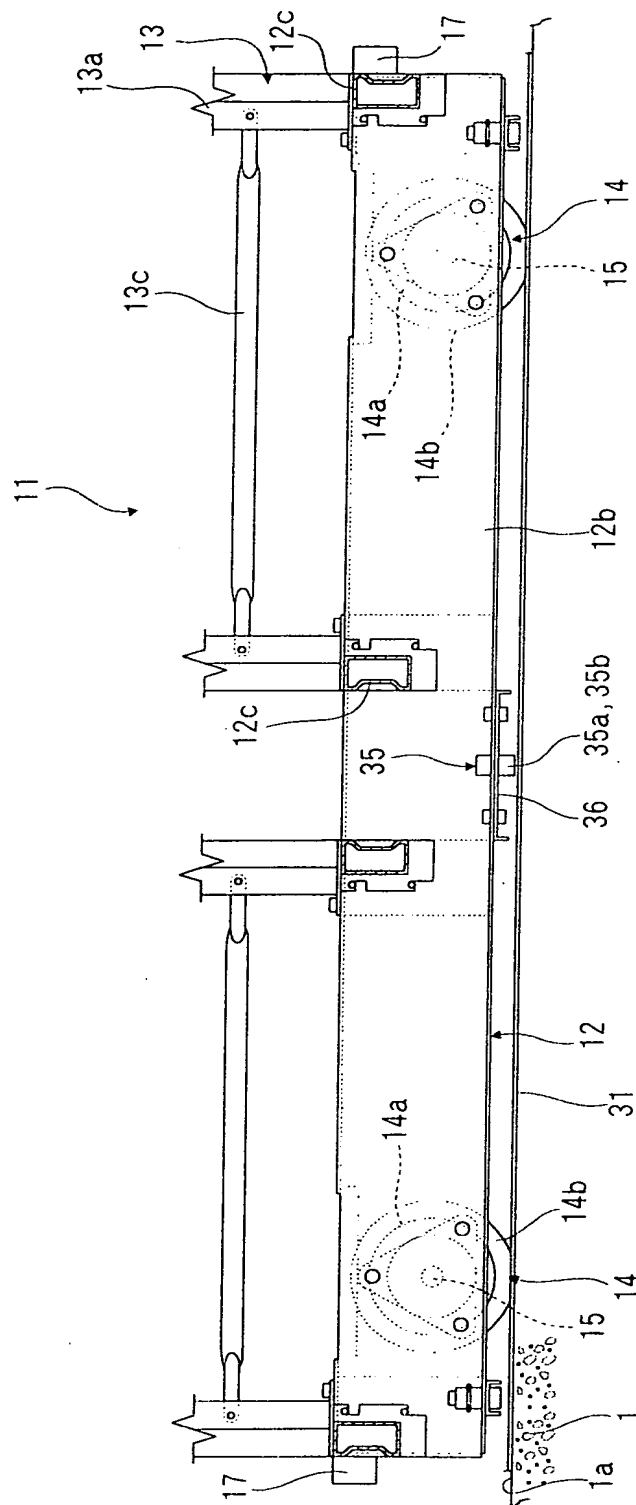


FIG. 6



The diagram illustrates a control system for a movable rack controller, organized into three main functional areas: **CONTROL PANEL**, **MOVABLE RACK CONTROLLER**, and **MOVABLE RACK**.

CONTROL PANEL (20): Includes a **MAIN CONTROLL PANEL (40)** and two sets of sensors: **PROXIMITY SENSOR (REAR) (37a)** and **PROXIMITY SENSOR (FRONT) (37b)** on the left, and **PROXIMITY SENSOR (LEFT) (35a)** and **PROXIMITY SENSOR (RIGHT) (35b)** on the right. A **STARTING POINT SENSOR (39)** is also present.

MOVABLE RACK CONTROLLER (41): This central processing unit contains several sub-units:

- TRAVEL JUDGMENT UNIT (43):** Receives signals from the proximity sensors and the main control panel to determine the **TRAVEL COMMAND (TRAVEL DIRECTION)**.
- TRAVEL RESET UNIT (44):** Receives a **TRAVEL START** signal and provides a **RESET** signal to the **COUNTER (45)** and **PULSE ERROR JUDGMENT UNIT (47)**.
- COUNTER (45):** Counts pulses from the **PHOTOELECTRIC SWITCHES (21)** and provides a **TRAVEL DISTANCE** signal to the **PREDICTION CONTROL EXECUTION UNIT (48)**.
- PULSE ERROR JUDGMENT UNIT (47):** Receives a **RESET** signal from the **TRAVEL RESET UNIT (44)** and provides a **RESET** signal to the **COUNTER (46)**.
- COUNTER (46):** Counts pulses from the **PHOTOELECTRIC SWITCHES (21)** and provides a **MOVEMENT DISTANCE** signal to the **DIFFERENTIATOR (50)**.
- PREDICTION CONTROL EXECUTION UNIT (48):** Receives the **TRAVEL DISTANCE** and provides a **PREDICTION** signal to the **DIFFERENTIATOR (49)**.
- DIFFERENTIATOR (49):** Calculates the **PREDICTED DISTANCE** based on the **TRAVEL DISTANCE** and **PREDICTION** signals.
- DIFFERENTIATOR (50):** Calculates the **PREDICTED DISTANCE** based on the **MOVEMENT DISTANCE** and **PREDICTION** signals.
- COEFFICIENT (51):** Provides a **COEFFICIENT** signal to the **DIFFERENTIATOR (50)**.
- TIMER (54):** Provides a **STOP** signal to the **PULSE ERROR JUDGMENT UNIT (47)** and the **DIFFERENTIATOR (50)**.

MOVABLE RACK: The output of the **MOVABLE RACK CONTROLLER (41)** is the **SPEED COMMAND VALUE**, which is sent to the **VECTOR CONTROL INVERTER (42a)** and **VECTOR CONTROL INVERTER (42b)**. These inverters drive the **MOTOR (16)** on the **LEFT** and **RIGHT** sides of the rack.

FIG. 10

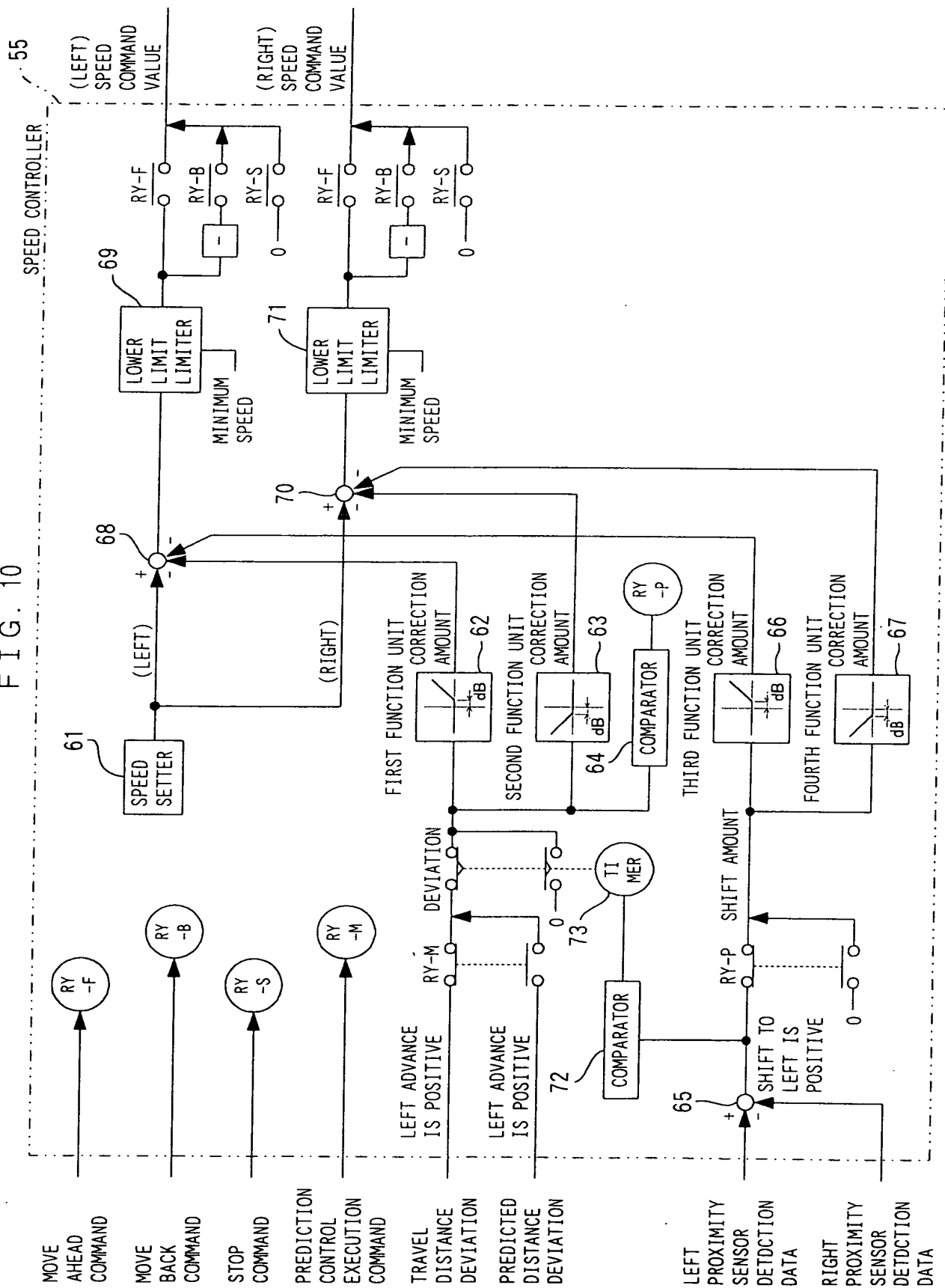


FIG. 11a

PULSE DIFFERENCE

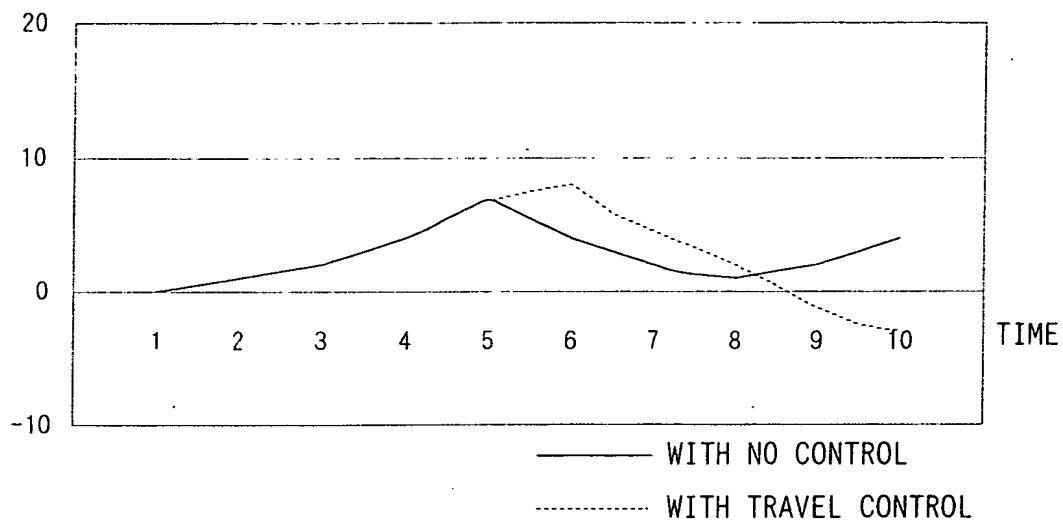


FIG. 11b

PULSE DIFFERENCE

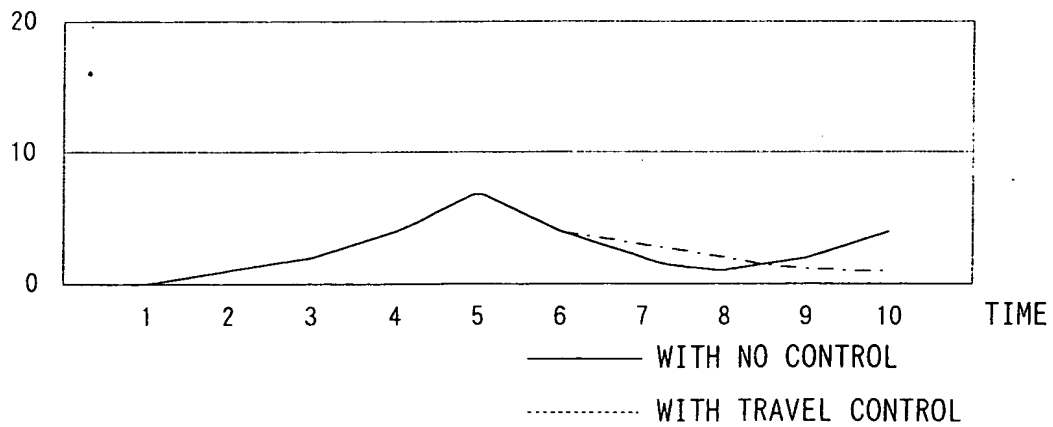


FIG. 12

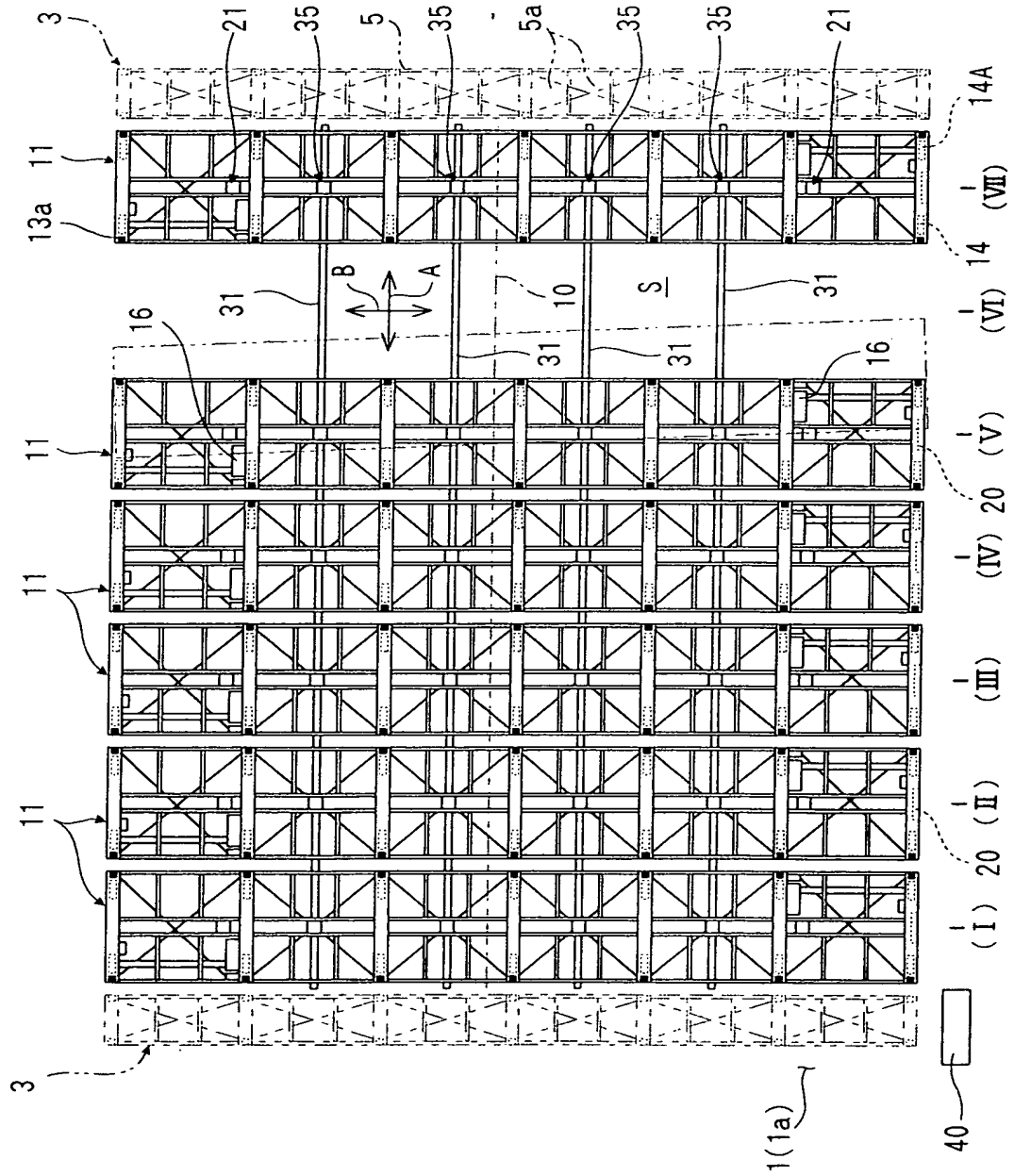


FIG. 13

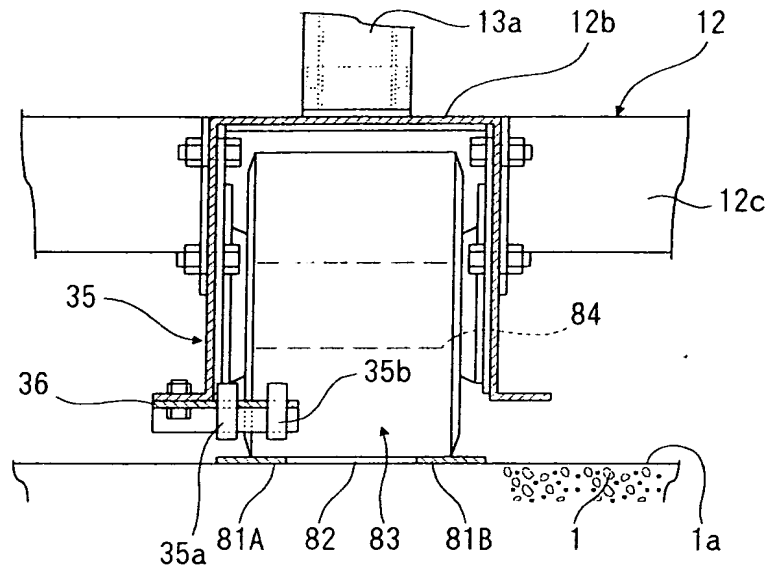


FIG. 14

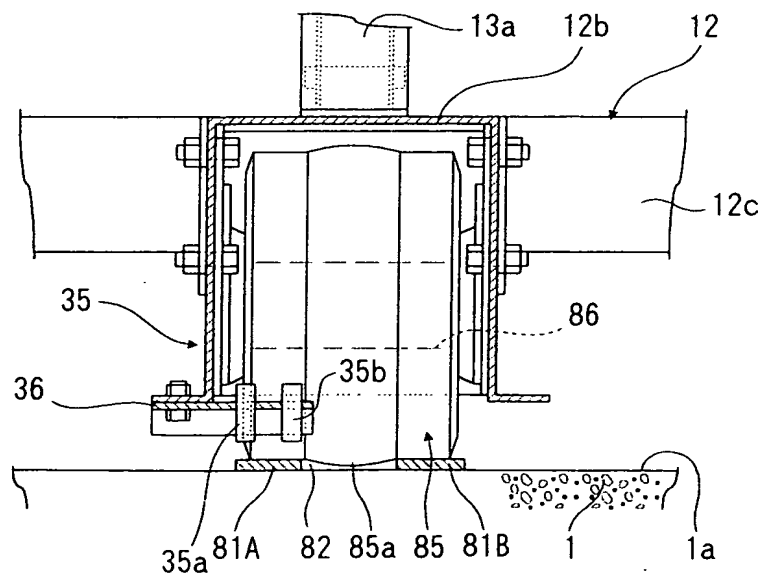


FIG. 16a

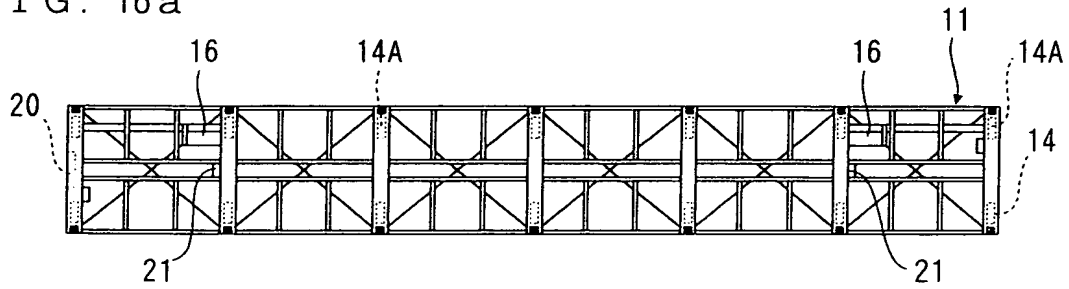


FIG. 16b

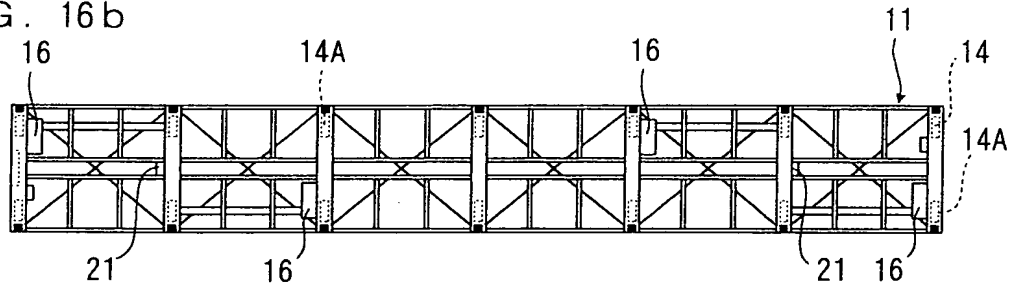


FIG. 16c

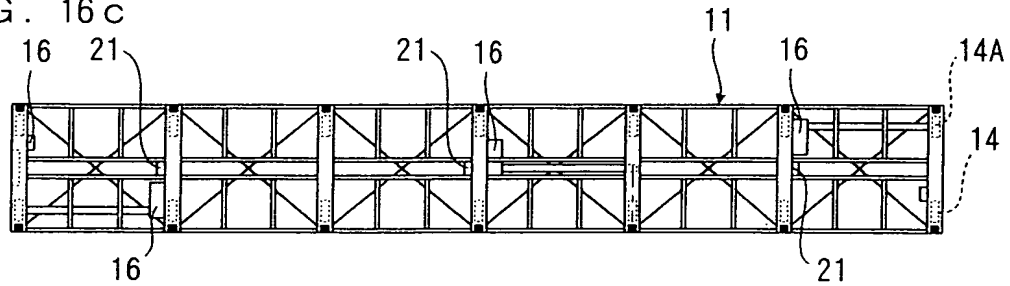
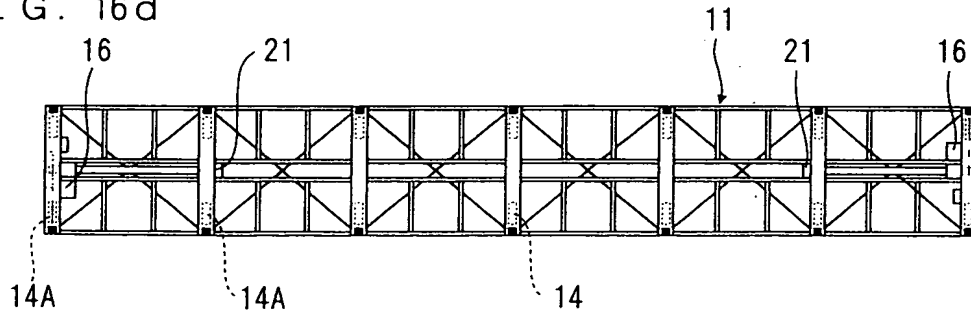


FIG. 16d



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